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I N T E L L I G E N C E A D V I S O R Y C O M M I T T E E

Report on Inspection Problems Involved in Possible

US-USSR Agreement Banning Production and

Deployment of Long-Range Ballistic Missiles

References: IAC-D-119, 26 May 1958
 IAC-D-119/1, 3 July 1958
 IAC-M-351, item 3

1. Attached is a copy of Mr. Dulles' letter to Mr. Farley of the State Department, transmitting the above report, which was discussed at the IAC meeting on 8 July.

2. We are also enclosing copies of a revised "Foreword" and page 4 for this report, which were inserted in the copies sent to Mr. Farley and should be substituted for corresponding pages in the copies of the report which you hold. These pages were redrafted to take account of the IAC discussion and certain remarks by General Schweizer. With respect to page 4, please note that the former paragraph 4 c has been converted into a footnote and is now referred to as an assumption rather than as a fact or estimate.

*inserted
in
document*

25X1A

[Redacted]
Secretary

Attachments - 2

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11 July 1958
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CENTRAL INTELLIGENCE AGENCY

Washington, D. C.
Office of the Director

10 July 1958

Mr. Philip J. Farley
Special Assistant to the Secretary of State
Department of State
Washington, D. C.

Dear Mr. Farley:

I am forwarding two copies of a report on "Problems and Feasibility of an Inspection Program for a Possible US-USSR Agreement to Ban Production and Deployment of Long Range Ballistic Missiles," which was prepared to meet a specific requirement of the Department of State, as outlined in your letter to me of 23 May.

This paper was drafted by an ad hoc working group of technical experts, including a number of Department of Defense officers and representatives of missile contractors who are not associated with the intelligence community. Consequently, this report should not be considered or used as an intelligence paper which has been formally approved by the Intelligence Advisory Committee or the Central Intelligence Agency.

I wish also to note that, during their discussion of this paper at the IAC meeting on 8 July, various IAC members emphasized that this report should be treated as one prepared solely to meet a specific request, and that certain statements contained therein should be used with caution and only in the context of the entire report. It was pointed out, for example, that the validity of the assumption in the footnote to paragraph 4 b would depend on the extent to which many pertinent factors were taken into account, including: number and location of targets, degree of hardness of bases, dispersal and alert status of defense forces, defense and early warning systems, yield of weapons, CEP, reliability of ICBM systems and the nature and effectiveness of other available weapons systems.

Sincerely,

/s/

Allen W. Dulles

Director

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TS #141793
IAC-D-119/1
3 July 1958
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I N T E L L I G E N C E A D V I S O R Y C O M M I T T E E

PROBLEMS AND FEASIBILITY OF AN INSPECTION PROGRAM
FOR A POSSIBLE US-USSR AGREEMENT TO BAN PRODUCTION
AND DEPLOYMENT OF LONG RANGE BALLISTIC MISSILES

1. The attached report was prepared by a special working group under the chairmanship of [REDACTED] CIA, in order to meet 25X1A a requirement of the State Department, as outlined in IAC-D-119, 26 May, and discussed at the IAC meeting on 27 May (IAC-M-343, item 4).

2. According to the "Foreword" to this report, it is to be considered a CIA reply to the Department of State request and is not intended to be an agreed or coordinated intelligence paper. However, the IAC members indicated that they desired to be kept appropriately advised regarding this working group's activities. This report has therefore been placed on the agenda of the 8 July IAC meeting, for noting. 25X1A [REDACTED]

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PROBLEMS AND FEASIBILITY OF AN INSPECTION

PROGRAM FOR A POSSIBLE US-URSS AGREEMENT TO BAN

PRODUCTION AND DEPLOYMENT OF LONG RANGE BALLISTIC MISSILES

WARNING

THIS MATERIAL CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, USC, SECS. 793 AND 794, THE TRANSMISSION OR REVELATION OF WHICH IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

CENTRAL INTELLIGENCE AGENCY

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9 July 1958

FOREWORD

The material in this study is based on a symposium held at CIA on 9 and 10 June 1958 and on supplementary discussions held during the month of June. Tab A is a list of individuals who participated in the symposium and discussions. These individuals contributed significantly to the substance of this report; the opinions, conclusions and recommendations included herein are the views of members of the task force. Therefore, this report should not be considered or used as an intelligence paper which has been formally approved by the Intelligence Advisory Committee or the Central Intelligence Agency.

Tab C is an annotated agenda for the symposium and Tab D is a summary of a briefing presented at the symposium covering those aspects of the USSR and its long range ballistic missile program appropriate to the problem at hand.

The findings in this report are considered to be preliminary.

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1. PROBLEMS:

To explore the feasibility of developing an inspection program designed to disclose any significant Soviet violation of a possible US-USSR agreement to ban the production and deployment of long range ballistic missiles. Specifically,

- a. To estimate the type of inspection system that would be needed for a high level of assurance.
- b. To recommend what other studies should be carried out and by whom.

2. CONCLUSIONS:

- a. An inspection system can be designed to disclose any significant Soviet violation of a possible US-USSR agreement to ban the production and deployment of long range ballistic missiles. Such a system as described in paragraph c. below could be assigned a reliability of 75% to 90%. Since the elements of this system are mutually reinforcing, the elimination or a reduction in scope of many of these elements would severely decrease the reliability assigned to the system as a whole. This is particularly true of element c (13).
- b. The earlier the inspection agreement* were concluded, the simpler and more reliable it would be.
- c. An inspection system with a reliability of 75% to 90% for detecting the production and deployment of a significant missile threat would require the following:
 - (1) A ban on the development, production and testing of long range ballistic missiles and rocket engines.
 - (2) The prohibition or stringent international control of the development, production, testing or use of vehicles for space operations.

* Throughout this paper the term inspection agreement is used to mean a US-USSR agreement to ban the production and deployment of long range ballistic missiles together with an appropriate inspection system such as defined in paragraph 2c.

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- (3) The declaration of existing stockpiles, production facilities and deployment sites for all types of ballistic missiles, including long range, short range and air defense.
- (4) The right to unrestricted access and inspection of these facilities and equipment, both declared and undeclared, to ascertain whether a long range ballistic missile capability is being concealed.
- (5) The destruction or stringent international control of existing long range ballistic missiles and their production and launch facilities. (Existing missiles and facilities might be converted under stringent international control to space exploration purposes.)
- (6) The acquisition of representative samples of production missiles and components for technical [redacted] analysis.
- (7) The control over materials possibly unique to the production of ballistic missiles (such as special stainless steels and aluminum alloys) if such are established to exist after technical analysis.
- (8) The right to unrestricted aerial and ground inspection to detect possible violations of the agreement.
- (9) The right to unrestricted surveillance of the railroad system and right to inspect suspicious rail shipments.
- (10) The right to unrestricted access to and inspection of naval and merchant vessels to discover clandestine missiles and missile launch facilities.
- (11) The right to unrestricted access to and inspection of shipyards capable of constructing or modifying vessels for launching of missiles.
- (12) The right to unrestricted access to and inspection of any other area, activity, or facility deemed suspicious.
- (13) The right to station on Sino-Soviet Bloc territory the required number of US personnel and technical equipment and US logistic support (transportation equipment, communications, etc.) and freedom of movement needed to implement the inspection agreement.

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(14) The application of the system outlined above to the entire Sino-Soviet Bloc.

3. RECOMMENDATION:

If the Department of State deems that the problem merits further consideration, it is recommended that the following studies be undertaken:

- a. The size, number and composition of inspection teams, technical equipment, their logistic support, transportation, communications, etc., needed to implement the inspection system. This could be based on the intelligence on the Sino-Soviet Bloc, particularly its missile program and likely target areas.
- b. The technical feasibility, requirements and problems of imposing a comparable system on the US and other NATO countries in order to assess similar aspects of the inspection agreement which might be encountered in imposing such an inspection system on the Sino-Soviet Bloc.
- c. The degradation of the high assurance level which would result from a reduction in scope of the inspection system described above.
- d. The techniques and facilities outside the inspection system needed to give assurance that violations of the agreement, or its intent, are detected.
- e. The feasibility, requirements and problems involved in processing, transmitting, and interpreting the information acquired by the inspection system.
- f. The degree of aerial inspection required under such an agreement.
- g. The feasibility and problems of designing a program of space exploration under international control which will minimize the diversion of space development results, space vehicles, and their production and launch facilities for long range ballistic missile purposes.

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4. FACTS BEARING ON THE PROBLEM:

a. National Intelligence Estimates* imply that the USSR could have available the following long range ballistic missiles:

Range	Time	Number
700 nm	1960	700
1000 nm	1960	100
	1962	200
ICBM	1960	100
	1961-2	500

b. The attainment of the capability to neutralize the US SAC** retaliatory forces through attack by long range ballistic missiles would represent such a military advantage to the USSR as to encourage the deliberate evasion of a US-USSR inspection agreement, particularly if coupled with the development of a highly effective Soviet air defense system against manned bombers. Furthermore, the desire to achieve a significant operational capability in anticipation of an inspection agreement may be so great that the USSR might bend every effort to attain the desired strike capability earlier than estimated (see 4.a. above) and might delay completion of an inspection agreement until this is accomplished. However, the USSR would know that US detection of evasion - or even a strong suspicion of evasion - would raise grave dangers of strong US reaction.

5. DISCUSSION:

a. In considering the problem it is necessary to distinguish between the activities and facilities involved in the production and deployment of long range ballistic missiles under normal conditions and those involved under conditions of an inspection agreement. Many of the activities which would be carried out under normal conditions are almost unique to these types of activities and could be detected by an inspection system; however, under conditions of an inspection agreement, many of these unique activities would be eliminated, and the concealment of others could be attempted.

* NIE 11-5-57, Soviet Capabilities and Probable Programs in the Guided Missile Field, and NIE 11-10-57, The Soviet ICBM Program, as revised, 20 May 1958.

** Solely for the purposes of this paper it is assumed that roughly 200 to 500 long range ballistic missiles together with the requisite launching capabilities sufficient to salvo this number of weapons would be a likely Soviet requirement to neutralize SAC. The current and projected medium bomber capabilities supplemented by long range ballistic missiles would be needed to neutralize the NATO retaliatory force.

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b. The great uncertainties concerning developments in weapons systems in the distant future has caused us to limit the discussion of the problem to the period 1959 to 1963. Although some of the factors pertinent to the problem within this time period are not greatly effected by the passage of time, some are of a more transitory nature and are more applicable to the immediate future, while others become more important the longer the effective date of an inspection agreement is delayed. The discussion which follows is therefore divided into three parts:

Considerations whose importance is little effected by time

Considerations whose importance decreases with time

Considerations whose importance increases with time

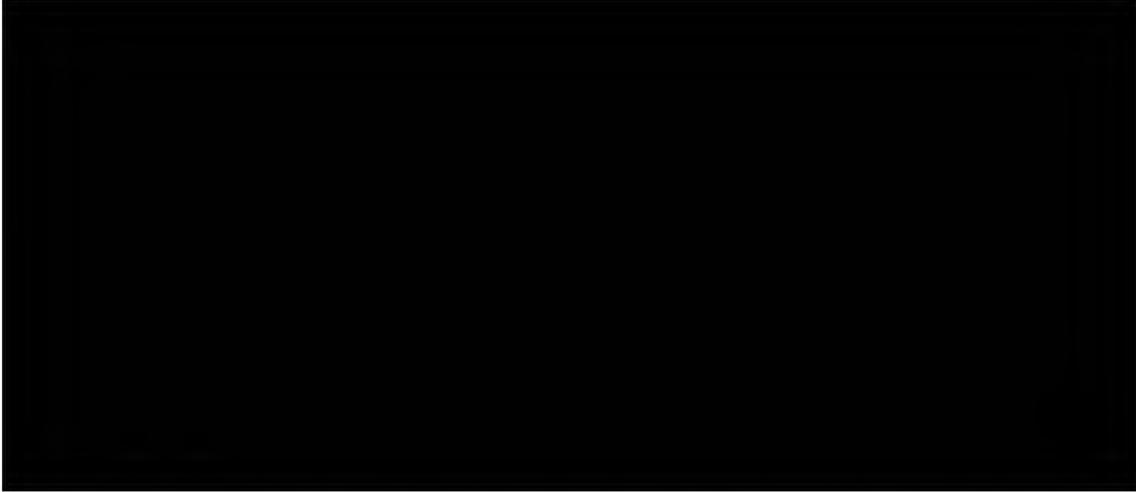
c. Considerations whose importance is little affected by time:

(1) Unrestricted development, production and testing of engines and vehicles for "peaceful" space exploration could facilitate the clandestine production and improvement of operational missiles and the development of new missile systems. A ban on space exploration would certainly contribute to a highly reliable inspection system. It is, however, conceivable that a space exploration program under stringent international control could be developed which would not degrade the reliability of the overall inspection system too severely.

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- (5) If technical analysis of representative samples of Soviet production missiles and components revealed the use of unique materials (such as special stainless steels and aluminum alloys), control over these materials would make evasion of the inspection agreement more difficult.
- (6) It is feasible to adapt short range ballistic missiles (by proper clustering and staging) so as to achieve long range ballistic missile capabilities. Therefore, the inspection of short range ballistic missile production and deployment facilities would constitute an important element of an effective inspection agreement.

d. Considerations whose importance decreases with time:

- (1) It is unlikely that the Soviet missile industry is now organized to permit evasion of an inspection agreement. It is probable that many of the components (except for electronics) of Soviet long range ballistic missiles are currently produced in the same plants which produce missile engines and airframes. The Soviet managerial incentive systems tend to create a large centralized industrial establishment in which many of the components which go into one end item are produced within the same complex.
- (2) Soviet long range ballistic missile systems are probably now based on non-storageable liquid fuels and radio-inertial guidance. These characteristics are somewhat more amenable to inspection than later developments considered under e. below.
- (3) We believe that the USSR does not now have in being the long range ballistic missile capability described in 4. c. above. Since fixed and hardened long range ballistic missile launch sites are most easily detected while being constructed, an inspection agreement effective in the near future would be far more likely to reveal clandestinely constructed launch facilities.

c. Considerations whose importance increases with time:

- (1) As time passes the USSR could develop new long range ballistic missile systems and increase the reliability of these systems significantly. Storageable liquid fuels and completely inertial guidance systems could be introduced and large numbers of these weapon systems could be produced and deployed in the later part of the period under consideration. The longer a possible inspection agreement is delayed, the lower is the confidence which can be assigned any inspection system.
- (2) Since long range ballistic missile launch sites are most amenable to inspection during construction, considerable delay in the effective date of an inspection agreement would increase the likelihood of constructing, equipping and concealing fixed sites before the agreement becomes effective.
- (3) Although under normal circumstances the test firing of production engines and missiles would be indicative of production and could be detected, with the passage of time ballistic missiles and their engines could become so reliable that they could be produced and "cold" tested with little degradation in reliability under an inspection agreement.
- (4) With the passage of time other means of violating an inspection agreement could be developed. Ballistic missiles could be deployed and operated from submarines and merchant vessels in the future. It is also possible to adapt short range and air defense missiles and facilities to accomplish part of the long range missile mission.
- (5) If significant numbers of missiles were already deployed and concealed before the inspection agreement were reached, they would be subject to deterioration over time. The confidence which Soviet military commanders could have in the performance of these missile systems and their launching crews would decrease, especially if these systems could not be tested and their crews trained by practice live firings.

Participants in the Symposium and Subsequent Discussions

	<u>Name</u>	<u>Organization</u>	<u>Notes</u>
25X1A	25X1A	CIA	(1, 5)
25X1A		CIA	(1, 2)
25X1A	Mr. J. Blanchet	State	(1, 3)
25X1A	Col. M. A. Cristadoro, Jr., USAF	ARDC, BMD	4
	Col. J. C. Fehringer, USAF	SAC, MIKE	5
25X1A	Col. C. J. Glasser, USAF	ARDC, BMD	5
	Col. E. N. Hall, USAF	ARDC, BMD	6
	Col. R. K. Jacobson, USAF	ARDC, BMD	3
	Mr. M. E. Jenkins	ABC	5
	Col. E. McFarland, Jr., USAF	GMIC	6
	Mr. H. D. Owen	State	7
25X1A			7
			4
		CIA	3
	Col. T. A. Rodgers, USA	OCRD	1, 2, 5)
	Mr. W. A. Smith	OSD	3
	Mr. L. D. Weiler	State	1
	Cmd. C. G. Welling, USA	ORD-N	7
25X1A	Col. J. A. Wetzel, USAF	ARDC, BMD	4
	Col. M. W. Wood, USA	DCB-OPS	5
			4
			1

Notes:

1. Symposium at CIA, 9 and 10 June 1958.
2. Discussions in San Diego, California, on 19 June 1958.
3. Discussions in Philadelphia, Pennsylvania, on 17 June 1958.
4. Symposium at CIA, 10 June 1958.
5. Discussions at AF BMD Liaison Office, The Pentagon, 11 June 1958.
6. Discussions at ARDC, BMD, Inglewood, California, 18 June 1958.
7. Symposium at CIA, 9 June 1958.

^{TAB B}
S-E-C-R-E-T

Special Assistant to the Secretary of State
Washington

May 23, 1958

Dear Mr. Dulles,

The Department of State is currently examining the problems involved in a possible US-USSR agreement to ban the production and deployment of long range ballistic missiles. In order to explore these problems it is necessary to evaluate the feasibility of developing an inspection program designed to disclose any Soviet violations of the agreement.

On the basis of preliminary conversations with representatives of your agency, it was concluded to approach the problem of inspection in the following manner:

- a. Select a group of individuals from government knowledgeable on the subject.
- b. Convene a symposium of these individuals.
- c. Prepare a report summarizing the pertinent conclusions of the meeting.

I should like to request, if in your view it is feasible, that CIA act as executive agent for this undertaking. The Department will assist in any way possible, especially in obtaining the services of individuals who may be selected.

Sincerely yours,

Philip J. Farley

The Honorable
Allen W. Dulles, Director,
Central Intelligence Agency.

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Subjects Considered at Symposium and Subsequent Discussions

Symposium

<u>Item</u>	<u>Speaker</u>
1. Introduction	25X1A [REDACTED] CIA
2. The Problem Why State Department needs this, where it fits, sensitivity	Mr. Lawrence D. Weiler, State 25X1A [REDACTED] CIA
3. Outline of the Task What is wanted: Not to be an "agreed" intelligence paper, just background for State. Not intend to design inspection system at these meetings; just consider feasibility of designing one. Discusses facilities, processes, activities involved in producing, deploying and operating--Peculiar to long range ballistic missiles. How "inspectable" are they? By what means (general)? Is problem worth further study? If so, what and how? Remarks about outline of agenda. Not only what US is doing but other alternatives.	25X1A [REDACTED] CIA
4. Background on the USSR (See Tab D.)	25X1A [REDACTED] CIA
5. Production, Rocket Engines For each of the engines describe facilities involved in production. Procedures and facilities for production testing. How much testing is absolutely necessary? a. Liquid Rocket Engines Storeable vs non-storeable fuels (Atlas, Jupiter, Thor, Titan, Others) b. Solid Rocket Engines Discuss manufacture of fuels, alternatives. (Polaris, Minuteman, Others)	Panel
6. Production, Airframe and Assembly For each of the missiles describe facilities involved in production. Procedures and facilities for testing.	Panel

<u>Item</u>	<u>Speaker</u>
a. Solid Types (Polaris, Minuteman, Others)	
b. Liquid Types (Atlas, Jupiter, Thor, Titan, Others)	
7. Production, Ground Support Equipment, Guidance, Fuels, Etc. Discuss production of ground support equipment, guidance equipment (inertial) and other), nose cone, warhead, transport equipment, liquid fuels (storables vs non- storables)	Panel
8. Summation and Recommendations on Production	Panel
9. Deployment Ground Consider problems of mobile vs fixed sites, Site selection, Construction (hard vs soft) guidance stations, logistics, maintenance, transportation, storables vs non-storables.	Panel
10. Deployment, Submarine and Surface Ships	Panel
11. Inspection for production and deployment in an environment of "peaceful" space exploration. Problems of distinguishing vehicles, launch facilities, activities, etc., involved in peaceful rocketry from those involved in attaining strike capability. Military data derivable from peaceful space program.	Panel
12. General Discussion, Other Problems Problems of "unique" materials, clustering shorter range missiles, reliability.	Panel
13. Summary and Recommendations Should further study be devoted to this. If so, what and by whom? Necessary conditions for inspection. How reliable would system be? Possibilities for evasion. Inspecting the inspection system.	Panel

Subsequent Discussions

1. Nose Cone
Facilities and unique materials,
Alternative re-entry concepts.

2. Unique Materials
3. Problems and Feasibility of Clustering
Shorter Range Missiles
Reliability, solids vs liquids.
4. Deployment, Mobile vs Fixed Sites.

Some Aspects of the USSR Pertinent to a Possible Ban on the Production
and Deployment of Long Range Ballistic Missiles
(A Briefing Delivered on 9 June 1958)

1. In order that you may apply your special knowledge and experience to the problems of long range missile production and deployment in the USSR, I will present some brief remarks about the USSR with respect to its geography, its industrial and scientific base, and the status of its long range ballistic missile program.

2. The USSR is about $2\frac{1}{2}$ times the size of the US, and its population is about 20% greater. Although its climatic conditions vary widely, a large part (about half) of its 7.5 million square miles is subject to permafrost conditions. The green lines on Figure 1 show the areas of the USSR which are subject to permafrost conditions as well as the inland waterways and ports which are subject to freezing conditions for extensive time periods.

3. The economy of the USSR is strong and varied and is second in size to that of the US. Soviet output of goods and services is about 45% of that produced in the US; however, it devotes a much larger share of its output to investment and military activities. In fact, industrial investment in electric power, metallurgical base and producers goods may actually be greater than that of the US this year. Its expenditure on military activities in dollar terms is about equal to ours.

4. Although a great part of the output of machinery production is concentrated in the western third of the country, there are significant industrial centers along the Transiberian Railroad and on the Pacific Coast. Figure 2 shows the major centers of machine building in the USSR.

5. For transportation the USSR depends more heavily on railroads than does the US. The base map of Figure 1 shows the Soviet railroad network. In terms of ton-miles, tons originated, and locomotives, the USSR is approximately equal to the US and Canada put together. However, because of its limited highway network, goods moved by motor vehicles is only one eighth that of the US.

6. The USSR is expanding its technical and scientific capabilities rapidly, particularly in those areas critical to industrial and military power. Although its over-all scientific capabilities may not be equal to ours, it has been able to make comparable achievements and to forge ahead in some areas of military and industrial significance by concentrating its efforts in these fields. For

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example, the number of university level graduates employed in scientific and technical fields already exceeds that in the US and will be about 40% greater than that in the US in 1962.

7. Now that I have presented a broad, though somewhat abbreviated background of the Soviet Union, I will briefly describe our knowledge and estimates of the Soviet long range ballistic missile program, in the fields of testing, production and deployment.

8. The history of Soviet guided missile development starts with the thorough exploitation of German scientists and technicians after the Second World War. Building on this knowledge, Soviet scientists and technicians have developed a missile program which has progressed steadily, and have test-fired some 300 to 400 ballistic missiles of ranges of 75 to 1,000 nm and approximately 10 ICBM-earth satellite vehicles to date. I do not have to emphasize to this group what this kind of experience means in terms of current and future capabilities.

9. The USSR is using two test ranges for long range ballistic missiles--one extending from the area of Stalingrad to about 1,000 nm east, the other extending from the area of the Aral Sea to about 3,500 nm northeast in the vicinity of the Kamchatka Peninsula. These ranges are well-equipped and probably can support test programs well into the future.

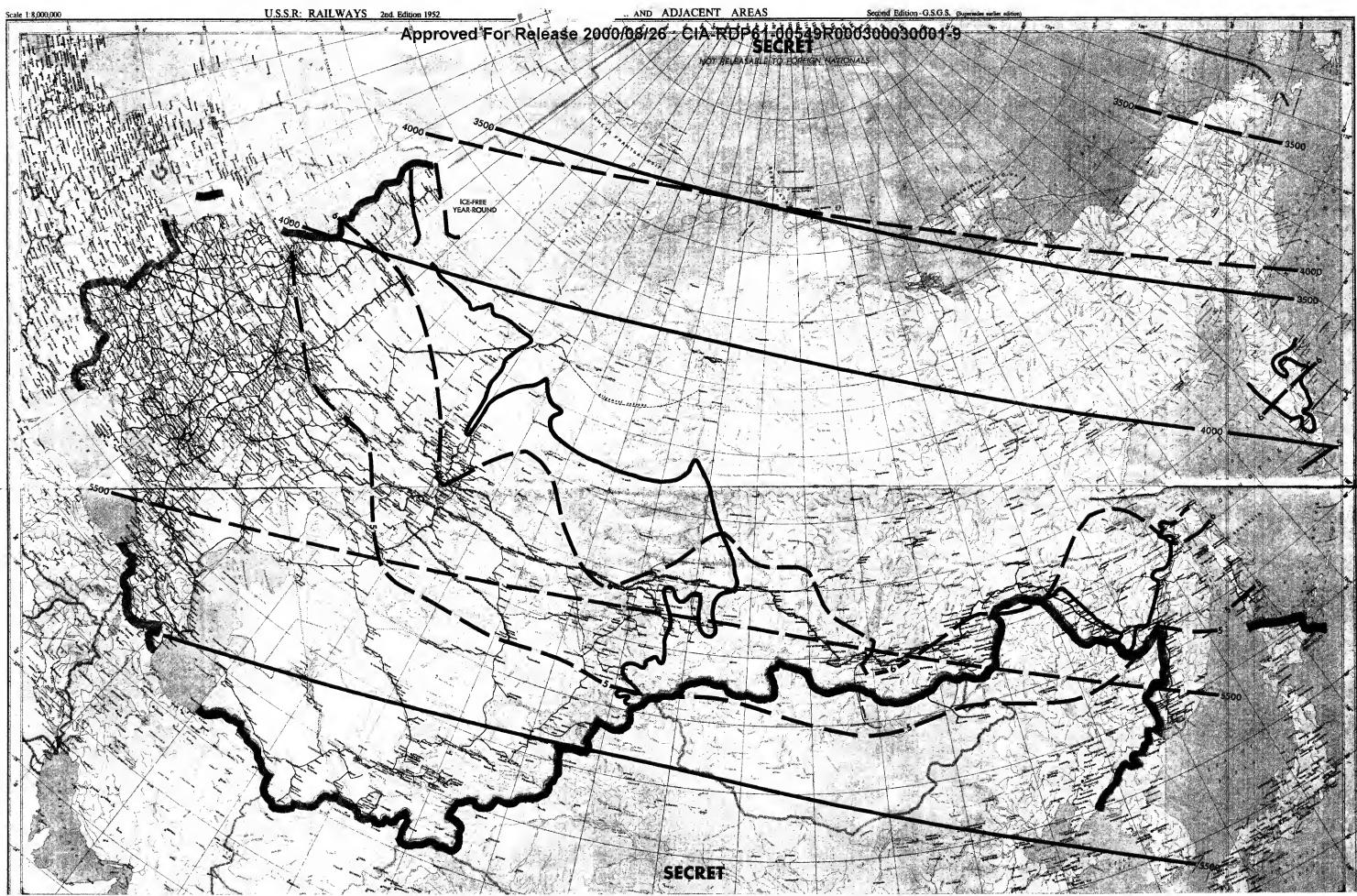
10. Although we know that several plants and research institutes in the Moscow-Leningrad area are involved in the Soviet missile program, we have not as yet identified any plants as producers of long range ballistic missiles. Because of the distribution of Soviet industrial facilities, we suspect that much of the missile production program is located in the industrial areas of Central and Siberian USSR, particularly in the Urals focused on Sverdlovsk or in the Novosibirsk or Tashkent areas. Any of these areas could supply both the Soviet missile test facilities and the more likely areas for missile launch sites. Furthermore, we should recognize that the extensive post-war industrial expansion program could have created plants about which we know nothing. These facts serve to emphasize the difficulties which would be involved in an inspection system.

11. Although we have no evidence of the existence of any operational ICBM-IRBM sites, on the basis of testing activities during 1957 and 1958, we believe that several operational sites could be completed within the next 12 to 15 months, if the program has been properly planned. We believe that the Soviet ICBM-ICBM operational concept will be based on the Soviet rail system--that these weapon systems will depend heavily on rail support and may even be rail mobile. The parts of the Soviet rail system most heavily involved in either of these concepts could cover an area of 2 million square miles. The

pink lines on Figure 1 give some indications of the distances and ranges involved between targets in the US and possible launching areas in the USSR.

12. The deployment aspect of the submarine launched missile is an extremely difficult problem. Although we do not believe that any of the 500 Soviet submarines are currently equipped to launch long range ballistic missiles, we know the USSR is developing new types of submarines. These may be designed to launch ballistic missiles.

13. In summary, the Soviet Union has a strong scientific and technical base which has demonstrated its capabilities in a wide variety of fields including electronics, aircraft and guided missiles. The Soviet industrial base has the capability to support the series production of the long range ballistic missile systems which Soviet scientists and technicians have developed. In addition, we estimate that the Soviet nuclear energy program has progressed to a point where nuclear war heads will doubtless be developed for long range missiles as required.



CLIMATIC LIMITATIONS

- Number of months river and coasts are ice-bound
- Southern boundary of permafrost

GREAT CIRCLE DISTANCES

- Nautical miles from Omaha, Nebraska
- Nautical miles from Shreveport, Louisiana

FIGURE 2 HAS BEEN OMITTED FROM THIS COPY